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ABSTRACT

In traditional education, the teacher is responsible for the students' learning. The teacher lectures to the students who take notes and then regurgitate the material for examinations to earn grades and diplomas. This type of learning situation may not be appropriate in a community college, where many students are adults who bring life skills and increased reasoning ability to the classroom. In such a situation, it may be appropriate for students to assume responsibility for their own education. One method of switching the responsibility of learning from the teacher to the students is called "guided design," a method developed by Dr. Charles E. Wales at the Center for Guided Design, West Virginia University. Guided design is a problem-solving process that uses small group techniques and a prepared outline of problem-solving steps to guide the groups' efforts. Any problem used in guided design must be open-ended and have more than one correct solution, must stimulate group interaction, and should be challenging enough to force the students to use resources beyond what are available in the classroom. The guided design approach was used in a course in Petroleum Technology at Casper College in Wyoming with a class of 80 students. Despite some problems caused by the diversity of backgrounds of the learners and the tendency of some groups to be monopolized by one or two individuals, the approach was successful and resulted in students learning more than could have been accomplished in a traditional classroom setting. Guided design is an educational alternative that can bring the spirit of freedom back into the classroom, help motivate students into self-discovery, and develop their reasoning skills. (KC)

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Adult Education

Guided Design
and
Student Participation

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Adult Education: Guided Design and Student Participation

ABSTRACT

The great educator, Comenius, once wrote that "learning is the responsibility of the learner." Yet, in the modern public school system and the various institutions of higher learning, teachers and instructors are reluctant to transfer this responsibility to where it belongs. When the teachers lecture and the students blindly take notes in preparation for graded tests, the responsibility of what is to be learned rests squarely on the shoulders of the teachers.

In adult education and community college education the instructors are challenged by an extremely diverse group of students. Many of these older and more mature students have excellent skills, training, and real life experiences, which might be utilized in the classroom to enhance and add another dimension to the quality of education.

One method of switching the responsibility of learning from the teacher to the students, and utilizing the diverse talents of the students, is "Guided Design." This educational approach was developed by Dr. Charles E. Wales at the Center for Guided Design, West Virginia University of Windsor.

After participating in a seminar on Guided Design conducted by Dr. Wales, the potential benefits of this educational technique in adult education seemed overwhelming. During the spring semester of 1983, the Petroleum Technology Department of Casper College experimented with Guided Design in a night class, which had eighty students enrolled on the first roster. The results were interesting and surprising. Although Guided Design when used in adult classes has several drawbacks, the stimulation and electricity generated in the classroom provides the impetus to continue developing this concept at the community college level.

The secret of Guided Design is to break the class into small groups that range in size from four to eight members. Their task is to solve an open-ended problem that parallels the notes, text, and lecture materials. Any problem used in Guided Design must have more than one correct solution, it must stimulate group interaction, and it should be challenging enough to force the students

to use resources beyond what are available in the classroom. The essence of Guided Design is:

Don't teach the students technology.
Instead, allow them to be technologists.

The potential for Guided Design in adult education, as well as any other level of higher education, is tremendous.

Introduction

Since the industrialization of the United States in the early twentieth century, educational systems have grown exponentially as people moved from rural America to urban America in search of prosperity and jobs. These educational structures have simultaneously matured and degenerated--especially in the public schools--because of rapid numerical growth, higher social expectations of schools, and a diminished budget on the national level where schools and colleges have taken a lower priority to national defense and a mushrooming bureaucracy. As a result, schools have become factories where, regardless of academic achievement or failure, most who matriculate will graduate.

Students now associate grades and degrees synonymously with education and learning. The rewards for attending twelve years of school are grade point averages and diplomas, while little is mentioned of the knowledge gained. Upon entering college or the work force individuals are asked whether or not they can think. Thinking is equivalent to reasoning. Yet reasoning is not part of the curriculum. A student needs only to have a photographic memory, a quick pencil, and a text and notes to study from to obtain the grade and diploma. For those students who question the system and its credibility there is the solemn threat of retribution. Therefore, the students either quickly adapt or find themselves on the street as unskilled laborers.

When children become eighteen, graduate from high school, and leave the protective womb of their families, they are challenged by life. As time lapses, they gain life-experiences and become adults.

This transformation may be relatively quick or slow. Regardless of time, when these potential adult students enter college it is a mistake on their part and the part of the system to assume that they cannot offer profound input into their education, and the education of those around them. Yet, all too frequently, they are encouraged to conform to the system if they are to be successful.

Ergo, the college system cannot treat the green student straight out of high school as equal to the adults who are returning to school after an academic hiatus. Adults normally have learned what has not been taught in high school, i.e. how to reason and make subsequent decisions.

Although, it is impossible to assume all college bound students are adults, the vast majority of community college students can be classified as adults. Therefore, the community college instructor has the luxury of an additional teaching resource in the classroom--adult students and their life and job experiences which might be tapped into as a source of information.

The Problem

As teachers we are usually allowed flexibility in designing the courses we are to teach. This is especially true in community colleges, four year colleges and universities, and less so in primary and secondary schools. The problem (or challenge) is to design the course so that it fits you as a teacher and the students, and as a result provides the environment most condusive to learning.

Dr. Charles Wales has laid out three of the most common methods used to create a course.[1] The fist method is the most common, considered to be the traditional format, and inherently the easiest for the teacher. This method is to choose a text and write a syllabus. The results are the traditional lecture, take notes, and regurgitate for a test, type course. This method has several advantages. First, if your course load is heavy, this method is quick and easy. Second, if you are unsure of yourself, it is safe because the knowledge is not yours, but that of text's author. And lastly, if your students need

a strong structure and a lot of guidance this is a good method because it demands from them relatively little in terms of time, creativity and reasoning.

The second method is to choose the primary teaching technique and build the course around it. The special techniques might include labs, computers (computeronics), overhead projectors, or slide films. Frequently these special techniques allow the students to progress at their pace. Unfortunately there is little room for flexibility and creativity on the students' behalf. And once the students decipher and conform to the "technique", the excitement often fades. Also it is difficult to utilize the talents of the adult students since the course is structured around the technique, rather than the student.

Wales' final category of course development is to choose the intellectual development to be achieved, and design the course to fit that objective. Although this phrase is somewhat abstract, and hence frightening, this technique allows the instructor tremendous freedom to design a course that will utilize all available resources, including the student. In the context of adult education, the instructor's greatest resource might be that adult sitting in the classroom. Yet this method, as will be shown later, does have its difficulties, one of which is that it demands more energy and committment from both the instructor and the student.

If the problem is to design a course that will allow students to reason, then, of the three alternatives presented, the last alternative provides the best solution. Problem solving in the right setting allows the development of the intellect via grooming of reasoning skills.

The Solution: Guided Design

As teachers, we can either provide the solution to the problem or the tools needed to solve the problem. If the student is encouraged to use the tools, they might discover the solution on their own.

Better yet, the tools that are used in problem solving can be used later when a similiar problem with a different solution arises.

Adult students in Petroleum Technology should not be taught technology. Rather, they should be allowed to be technologists. This approach is much more condusive to the intellectual development of a thinker, rather than the traditional teacher/lecturer approach.

The Guided Design approach allows the student the freedom to solve the problem, sometimes using methods that might be considered unorthodox. Yet there is still discipline in this classroom method because a logical process must be used and accounted for while the problem is being solved, i.e., solutions from "out-of-the-blue" obviously would not be well received. Guided Design provides for a structured and systematic approach to problem solving. Therefore, the process is more important than the solution. The secret to Guided Design is to supply a problem or situation that has multiple or open-ended solutions. Then provide the adult students an outline that must be followed--albeit, minor adjustments in the structure are encouraged if they facilitate solving the problem--to solve the problem.

This typical project outline might include the following:

PROJECT OUTLINE

Situation	Describe the setting and the open-ended problem which must be solved. If new concepts are to be learned in conjunction with this project, the situation should provide an appropriate setting for their use.
Goal of the Project Work	State the goal of this decision-making project. When the project is completed, what will be the result.
Gather Information	What information is needed to proceed with the problem solution and where can it be obtained? This step may require additional study or it could simply mean organizing the background information available for the project work. (Note that while this step often occurs here, it could

	occur somewhere else or as part of other decision-making steps.)
Possible Solutions	List three or more ways that might be used to achieve the goal of the project.
Constraints	List the factors which limit what can be done. In many cases, the constraints serve as the criteria for evaluating the possible solutions.
Choose	Using whatever criteria have been identified, evaluate and rank the possible solutions. Before a solution is chosen for further work it should be tested for both positive and negative consequences.
Analysis	Dissect the chosen solution and identify the important factors that must be considered when a detailed solution is developed in the synthesis step. This list of factors may take the form of a series of questions which must be answered in the synthesis step (who, what, when where, how).
Synthesis	Combine the factors identified or the answers to the questions asked in the analysis step and produce a detailed solution. (Note that the Feedback here may include a "model" solution, or be left incomplete, or be omitted entirely so the learners are on their own.)
Evaluation	Describe either the evaluation of the solution or the way in which an evaluation could be performed.
Recommendations	Recommend an appropriate course of action.
Report	Prepare a report which describes what has been done.[2]

After an explanation of the outline has been presented by the instructor to the students, a wave of anxiety will pass across the classroom, and if the instructor is lucky, a plethora of questions will quickly follow. This reaction should be considered normal because you will probably be the first teacher they ever had that truely challenged them to be responsible for their own education, hence they will be scared.

At this point it is best to present to the students a trial problem that they can get their feet wet in. Many practice problems have

been offered by the architects of this teaching concept. The sample problem that was used in the Petroleum Technology class at Casper College was the "Ship Wrecked" problem which can be found in the Guided Design book provided by Wales.

The situation for the problem in the Petroleum Technology course was:

> Your company has been asked to design the casing and cement, for the surface casing of a well near Lysite, Wyoming. The overall projected depth of a well in this area is approximately 22,000 feet. This area is known for its high formation pressures and complex geologic structure. It is not uncommon for these wells to cost over twenty million dollars to complete because of all the unforseen problems.

This particular Petroleum Technology course covered oil well completion and stimulation, and it was being offered at night. The initial enrollment was eighty students, and there were no teachers aids. Before the first night, I was hoping the class would not exceed thirty, but because of a departmental policy I was unable to put a limit on class size. The class was composed of many professional geologists, engineers, completion technicians, drillers and oil field service people. There were several housewives, clerks, one lawyer, a small group of full-time day students, a few accountants, and one librarian. To stimulate and teach such a diverse group was not only challenging, but overwhelming. Guided Design seemed, initially, like a perfect solution--let the students teach each other!

Once the problem was presented, eleven groups of seven to eight students were assigned and the real work began. The class was set up in one, three and a half hour block every week. The first hour to hour and a half was devoted to lectures, special presentations and guest lectures. The latter half of the class was set aside for group work.

As the students attacked the problem, immediate feedback from the instructor was required after each step was completed in the decision making process. For example: After each group completed the "Possible Solutions" step, the instructor would, join in a discussion of each possible solution. Feedback is essential, other-

wise the group might deviate from the decision making process, or, worst yet, lose interest because they feel their efforts are not appreciated by the instructor.

After the first group session, I began wearing sneakers to class to facillitate my running from group to group. Although the Guided Design process was initially met with skepticism and reluctance, after three sessions this new educational concept began gaining momentum and acceptance, and was even a little bit of fun.

Observations

Group problem solving changed the entire atmosphere of the night class. Many students started doing individual research during the week, then sharing their information with the class at night. It became a regular practice to zerox articles, calculations, and notes, which one student would want to present and supply to the class. One night an older student brought in an excellent algorithm on how to design casing dependent upon its weight, yield and tensile strength. Sharing might be one word that would sum up the entire experience.

To improve the organization within each group, the group elected a chairperson. The chairperson's job was to maintain a record of the group's interaction, and to maintain momentum within the group by acting as the group facillitator. In order to encourage responsibility within the group, I asked for individual evaluations of students from their fellow group members. These evaluations were surprisingly refined and accurate. The evaluations consistently reported any individual who was not performing up to the group's expectations. This evaluation process was good because it presented a relatively fair basis for grades that went beyond personalities.

As expected, the quality of the solutions and the reports, which were required from all the students explaining their solution and the decision making process, were much higher than normally would have been received if the problem had been solved by individual students. And why not! In the real world, where employees are required to interact with cohorts, group problem solving is part of the normal routine.

Unfortunately, one of the greatest problems with Guided Design was motivating the student who normally was reticent into a position of

full participation and leadership. Although the assumption might be presented that peer pressure would force the quiet individual to interact, there was the conflict with the extroverted student who was able to manipulate and control the overall group response. Some groups had two and even three dominant personalities, which was more than enough to overwhelm the shy student. Also when a group had two or more strong personalities, they often times found themselves at odds with each other. The instructor should then emphasize the positive aspects of such a reality situation, and make comparisons between the classroom and workplace.

Another point of observation concerns the size of the class. Ideally, twenty students would have to be an optimim number, forty students might have been acceptable, but seventy-eight students taxed the educational experience where abandonment seemed, at times, to be the only solution to the chaos.

Because this class had sixteen young, full-time day students, comparisons between these students and the older, more mature, working adult students may be formulated. Initially, the adult student appeared to be very hesitant about the Guided Design process. Probably this can be attributed to the fact that they had been out of school for several years or longer, and were not sure of their capabilities. But as the program progressed, and they realized that they were capable of gathering information, reasoning, and solving a problem, most adults became educational dynamoes.

On the other hand, the day students, having been throughly conditioned to the classroom because of recent experiences, tended to balk at group oriented education more vehemently because most were aware of how successful they had been in the traditional classroom, where they were not required to research a problem and think. As the program progressed, many day students assumed minor roles in their groups. The rationale for this may have been that they did not feel equal to their adult counterparts, or that they knew what the minimum amount of required work was, and they did not wish to devote any excess energy or time toward putting together professional quality work. This too was not surprising because the present educational structure does not encourage attainment of knowledge.

Fortunately, one way to encourage full-time day students to submit professional quality work--versus academic quality work--is to have them work side by side with adults. This group situation, and the inherent blend of individual talents, allowed the day student to observe first hand what type of work will be required of them when they leave the secure world of college. Also, the mixture between young and adult students provided an ego boast to the adult student. Why? Because when they saw what the typical, young, full-time student emitted, they began to appreciate their own capibilities. Both types of students mutually benefited from their interaction.

It should be pointed out that Guided Design has one major drawback. It requires more work and time from both the instructor and the students. If the experience is to be successful the instructor must realize that there will be extra preparation and a continual need to supply the students with feedback. For the student to gain the most from the project they must be willing to expand beyond the classroom resources. The instructor should be challenging the students to be responsible for their own education.

Conclusion

Adult students are sometimes the most fragile of all students. They have been out of the formal education system for several years, yet they have been involved in informal education. When these students enter into the academic classroom after a hiatus they are putting their egos and academic future into their teacher's hands. If the teachers so desire they can subject their students to a preliminary test that will surely discourage some adult students. This process is often used to solve the problem of overcrowding. Or if the teachers are more understanding and benovelant, they incorporate a classroom concept similiar to Guided Design that will utilize the adult students' talents, and encourage them to proceed with high academic standards throughout their educational career. This potential exists in the Petroleum Technology department at Casper College, and could exist in most educational programs.

Donald Seckinger in his essay, "Freedom and Responsibility in Education" wrote, "Freedom in education demands occasions for learning. These occasions require teachers who are open to the intellectural risks involved in sharing discoveries in knowledge with their students. Free-

dom involves students in the uncoerced appropriation of knowledge that may lead on to self-discovery, and the awareness that one is responsible for his own decisions."[3] Guided Design is one educational alternative that can bring the spirit of freedom back into the classroom, help motivate any student into self discovery, and develop their reasoning skills. Adult students seem to respond more quickly to Guided Design than their younger counterparts. They are also allowed the opportunity to share their knowledge and build their confidence in a positive, structured format.

Footnotes

[1]Robert A. Stager and Charles Wales, The Design of an Educational Experience, College of Engineering, West Virgina University, Morgantown, West Virgina, 1970, p. 8.

[2]Charles Wales and Robert A. Stager, Guided Design, Center for Guided Design, West Virgina University, 1977, p.19.

[3]Donald Sockinger, "Freedom and Responsibility in Education," The Great Educators, Chicago: Nelson Hall Company, 1972, p.766.